Immune mechanisms during preterm sepsis

Published: 28-10-2020
Last updated: 08-04-2024

The quality and quantity of the innate immune response to bacteria should be tightly regulated leading to resolution of infection while minimizing damage to host tissue. We hypothesize that this regulation depends on gestational age at delivery and...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Bacterial infectious disorders
Study type	Observational invasive

Summary

ID

NL-OMON49081

Source
ToetsingOnline

Brief title
IMPRESS

Condition

- Bacterial infectious disorders
- Neonatal and perinatal conditions

Synonym
blood-poisoning, sepsis

Research involving
Human

Sponsors and support

Primary sponsor: Erasmus MC, Universitair Medisch Centrum Rotterdam
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: immunology, neonatology, prematurity, sepsis

Outcome measures

Primary outcome

To characterize the in vitro immune response of preterm and term newborns

against sepsis-related bacteria during the first ten weeks after birth

Secondary outcome

To compare the in vitro immune response of umbilical cord blood with the immune

response of preterm and term newborns in the first months of life

Study description

Background summary

Every year, more than fifteen million newborns are born preterm worldwide. Preterm newborns, defined as a gestational age below 37 weeks, have an immature immune system and are highly susceptible to life-threatening infections and sepsis. In the Netherlands, approximately 10% of mortality in newborns is due to sepsis despite treatment with intravenous antibiotics. Newborn mainly depend on the innate immune cells such as monocytes and granulocytes to fight bacterial infections. However, it is largely unknown how the innate immune system of preterm newborns responds to bacterial infections. In vitro research with whole blood from preterm newborns can be used to investigate early life preterm immune responses against bacteria. A better understanding of the immune response to bacteria in preterm newborns will create more insights into the susceptibility of preterm neonates to severe infections and may lead to novel adjuvant therapy such as immunomodulatory therapy to balance the immune response elicited during infections.

Study objective

The quality and quantity of the innate immune response to bacteria should be tightly regulated leading to resolution of infection while minimizing damage to host tissue. We hypothesize that this regulation depends on gestational age at delivery and postnatal age. The main objective of this study is to characterize the functionality of the innate immune system of preterm newborns in the

context of bacterial infections at birth and in the first 10 weeks of life.

Study design

The study will be a prospective, observational study. Newborns born by vaginal delivery and caesarean section will be included. Blood will be collected from preterm and term newborns in the first 10 weeks of life. Per individual, blood will be collected on multiple time points after birth to investigate the development of the immune system per individual. The maximum frequency of sampling per individual will be once a week for a maximum of 8-10 weeks. Our study will not lead to additional venous or arterial punctures. Prematurity is defined as deliveries ranging from 24 to 37 weeks of gestational age. Blood from term newborns will be included as a control group. Term newborns are defined as newborn born after 37 weeks of gestational age. To characterize innate immune response to bacteria, we will measure inflammatory parameters in plasma and we will perform multiple immune-assays after in vitro exposure of blood to bacteria and synthetic bacterial stimuli. Because we are currently already performing similar experiments with umbilical cord blood, we will be able to compare the in vitro immune response after birth with the immune response of the umbilical cord.

Study burden and risks

The use of blood from preterm and term newborns can have a substantial burden and risk with participation. Key recommendations from the WHO that describe acceptable blood draws from newborns will be followed (see Ethical Section below). Blood will only be taken if a venous or arterial puncture is performed for medical reasons (e.g. blood culture) or when an arterial catheter is in situ. Our study will not lead to a direct benefit of the patient. However, a better understanding of the immune response during bacterial infection in preterm newborns may lead to earlier recognition of severe infections, more effective treatment options and, thereby, a better outcome for the same patient group in the future. This study cannot be performed in a different group of patients, because the main objective is to study immune responses in this specific group that is vulnerable for severe bacterial infections.

Contacts

Public
Erasmus MC, Universitair Medisch Centrum Rotterdam

Doctor Molewaterplein 40
Rotterdam 3015 GD
NL

Scientific
Erasmus MC, Universitair Medisch Centrum Rotterdam

Doctor Molewaterplein 40
Rotterdam 3015 GD
NL

Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Children (2-11 years)

Inclusion criteria

Preterm and term newborns with a gestational age of 24 weeks to 42 weeks of gestation who are admitted at the Erasmus Medical Centre-Sophia Children*s Hospital

Exclusion criteria

Parents that do not have sufficient understanding of the Dutch language and are therefore not able to comprehend the patient information sheet

Study design

Design

Study type:	Observational invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial

Masking:	Open (masking not used)

Primary purpose: Basic science

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	15-04-2021
Enrollment:	300
Type:	Actual

Ethics review

Approved WMO

Date:	28-10-2020
Application type:	First submission
Review commission:	METC Erasmus MC, Universitair Medisch Centrum Rotterdam (Rotterdam)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL72257.078.20